EXHIBIT A

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US006018774A

United States Patent [19]

Mayle et al.

[11] **Patent Number: 6,018,774**

[45] **Date of Patent: Jan. 25,2000**

[54] **METHOD AND SYSTEM FOR CREATING MESSAGES INCLUDING IMAGE INFORMATION**

[75] Inventors: **Neil L. Mayle**, Cambridge; **David L. Rose**, Boston, both of Mass.

[73] Assignee: **YoBaby Productions, LLC**, Cambridge, Mass.

[21] Appl. No.: **08/887,616**

[22] Filed: **Jul. 3, 1997**

[51] **Int. Cl.**[7] **G06F 13/00**

[52] **U.S. Cl.** **709/250**; 7091203; 7091206

[58] **Field of Search** 3951210.36, 200.76, 3951200.8, 200.33, 200.47; 7091206, 246, 250, 203, 217

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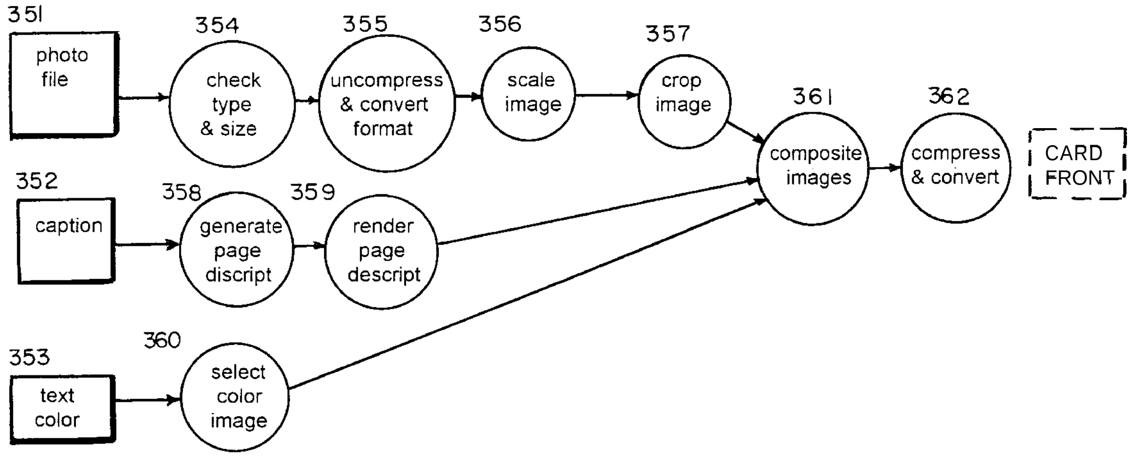
Primary Examiner—Zarni Maung
Attorney, Agent, or *Firm*—Choate, Hall & Stewart

[57] **ABSTRACT**

A system for creation of an image display such as an electronic postcard. The system interacts with a user to create and configure the display. The user provides the image data to the system and optionally specifies a message and addressee for the image display. The system creates the display, comprising a mixture of image and textual data, and sends a notification including identification of the display to a specified addressee, for instance, the recipient of the postcard. The addressee can then request receipt of the display from the system via the identification information sent by the system.

6 Claims, 18 Drawing Sheets


351
photo file
354
check type & size
355
uncompress & convert format
356
scale image
357
crop image
361
composite images
362
compress & convert
CARD FRONT
352
caption
358
generate page discript
359
render page descript
353
text color
360
select color image

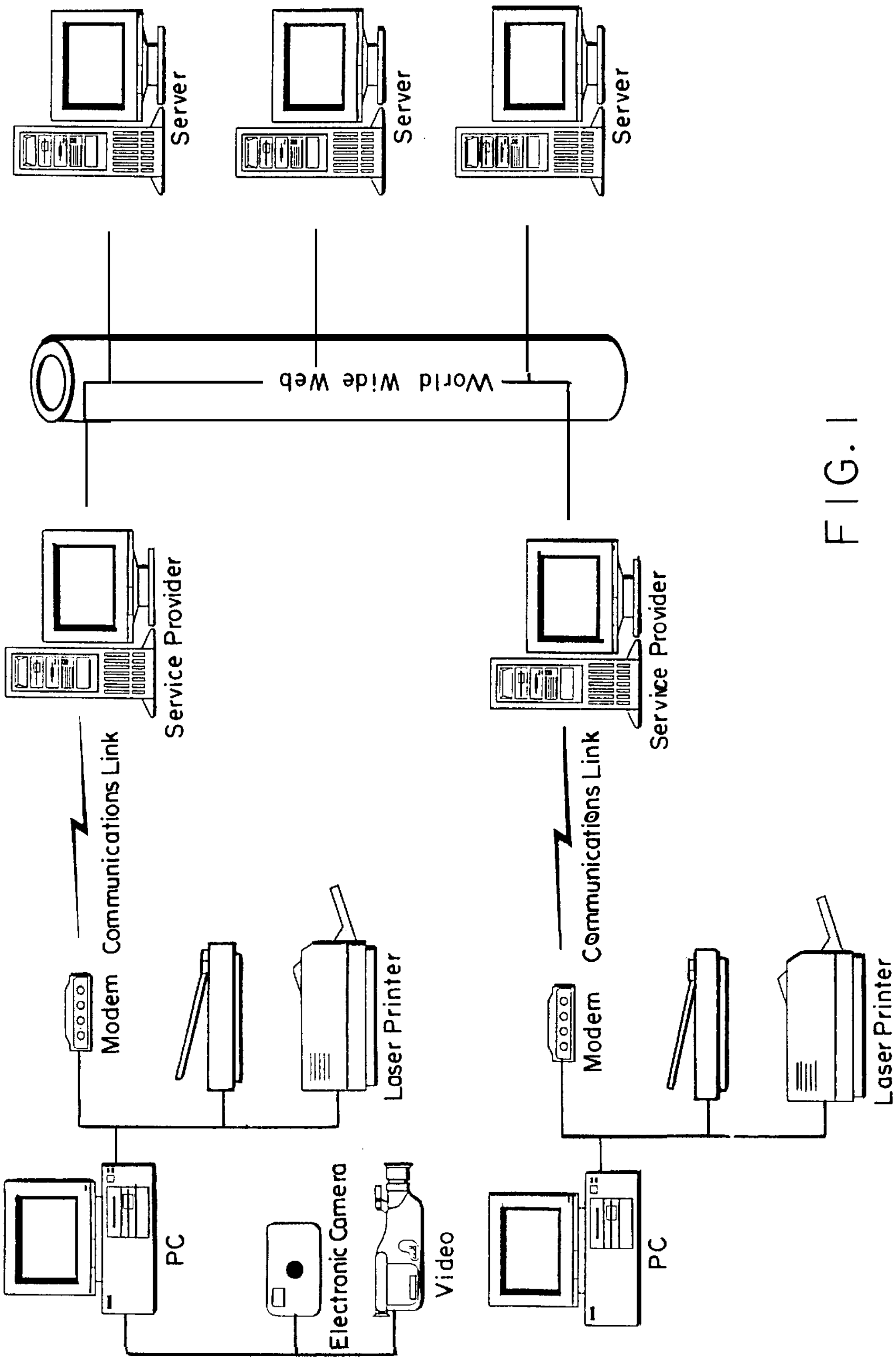

Server
Server
Server
World Wide Web
Service Provider
Service Provider
Communications Link
Communications Link
Modem
Modem
Laser Printer
Laser Printer
PC
PC
Electronic Camera
Video

FIG. 1

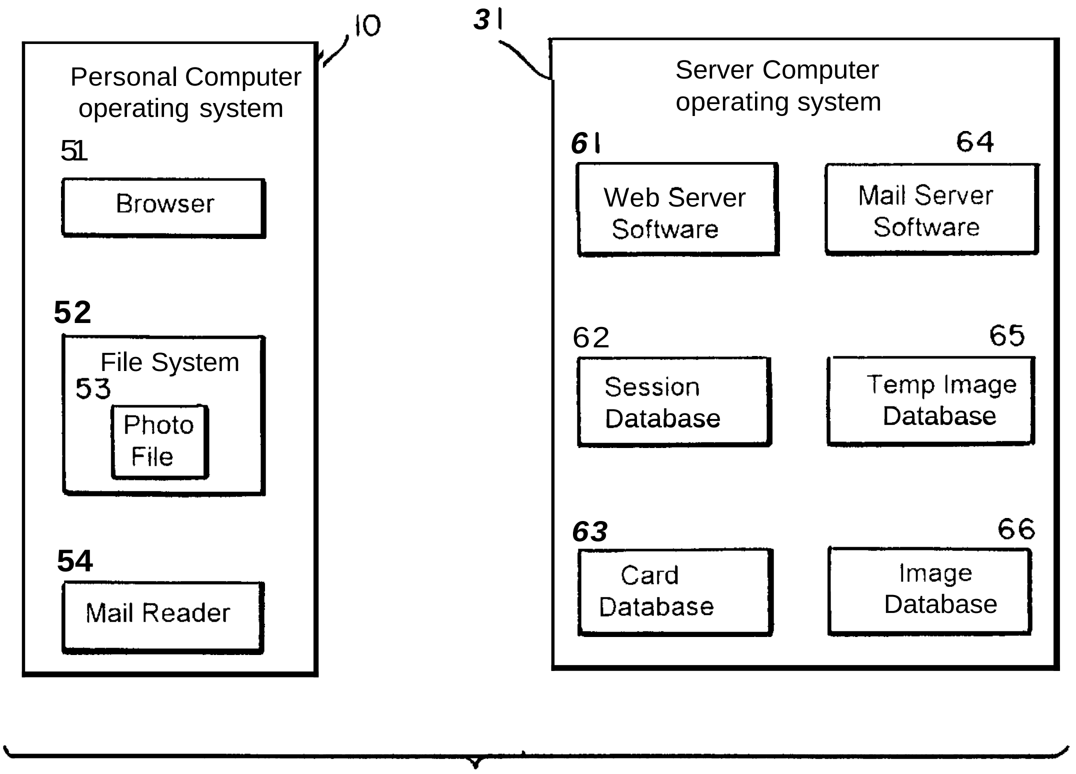

10
31
Personal Computer operating system
51
Browser
52
File System
53
Photo File
54
Mail Reader
Server Computer operating system
61
Web Server Software
64
Mail Server Software
62
Session Database
65
Temp Image Database
63
Card Database
66
Image Database

FIG. 2

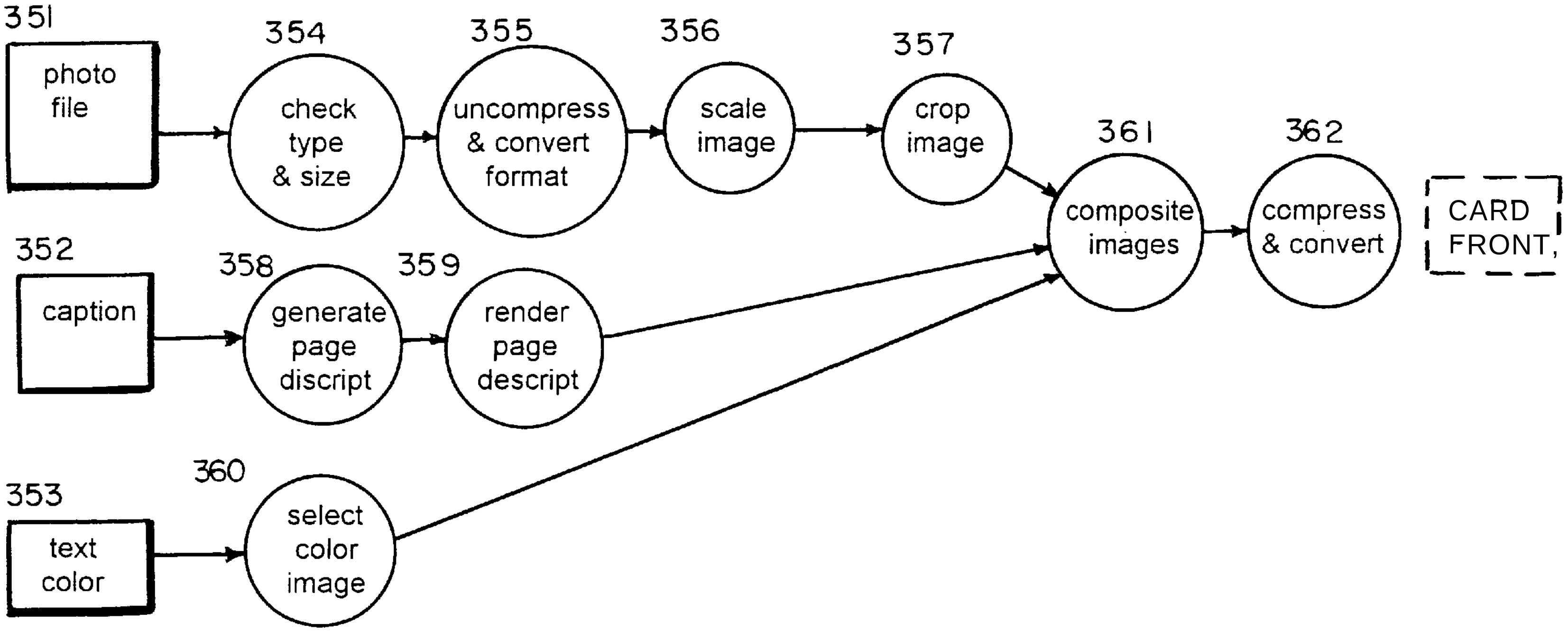
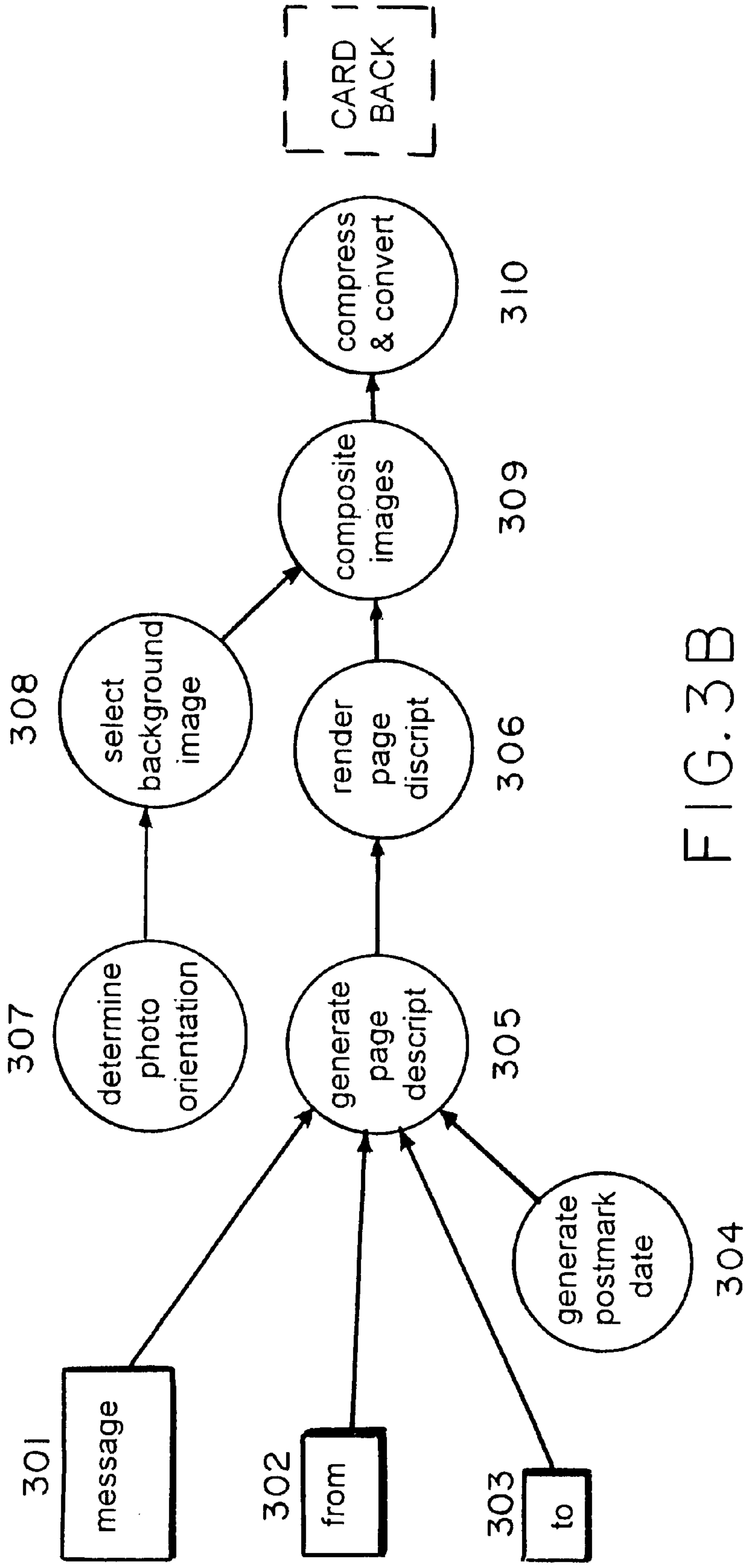
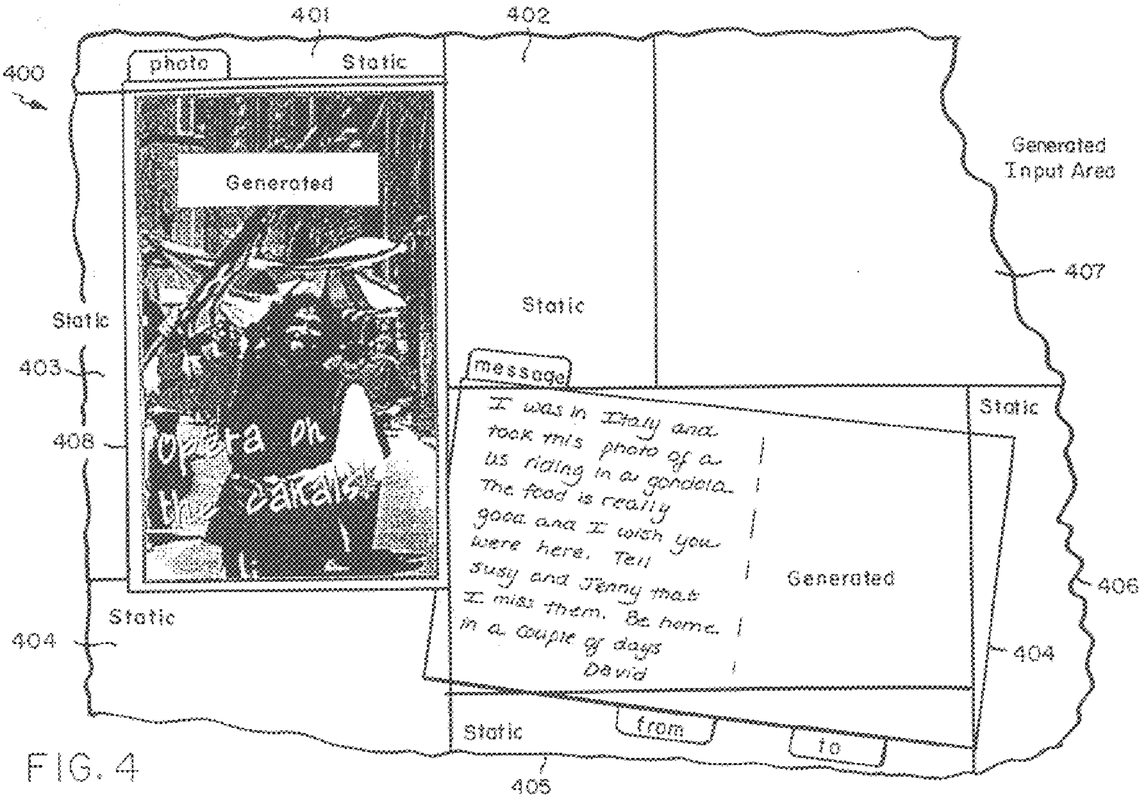

351
photo file
352
caption
353
text color
354
check type & size
355
uncompress & convert format
356
scale image
357
crop image
358
generate page discript
359
render page descript
360
select color image
361
composite images
362
compress & convert
CARD FRONT,

FIG. 3A



301
message
302
from
303
to
304
generate postmark date
305
generate page descript
306
render page discript
307
determine photo orientation
308
select background image
309
composite images
310
compress & convert
CARD BACK

FIG. 3B



400
401
402
photo
Static
Generated
Static
Static
403
408
message
I was in Italy and took this photo of us riding in a gondola. The food is really good and I wish you were here. Tell Susy and Jenny that I miss them. Be home in a couple of days
David
Generated
Generated Input Area
407
Static
406
404
Static
404
Static
from
to
405

FIG. 4

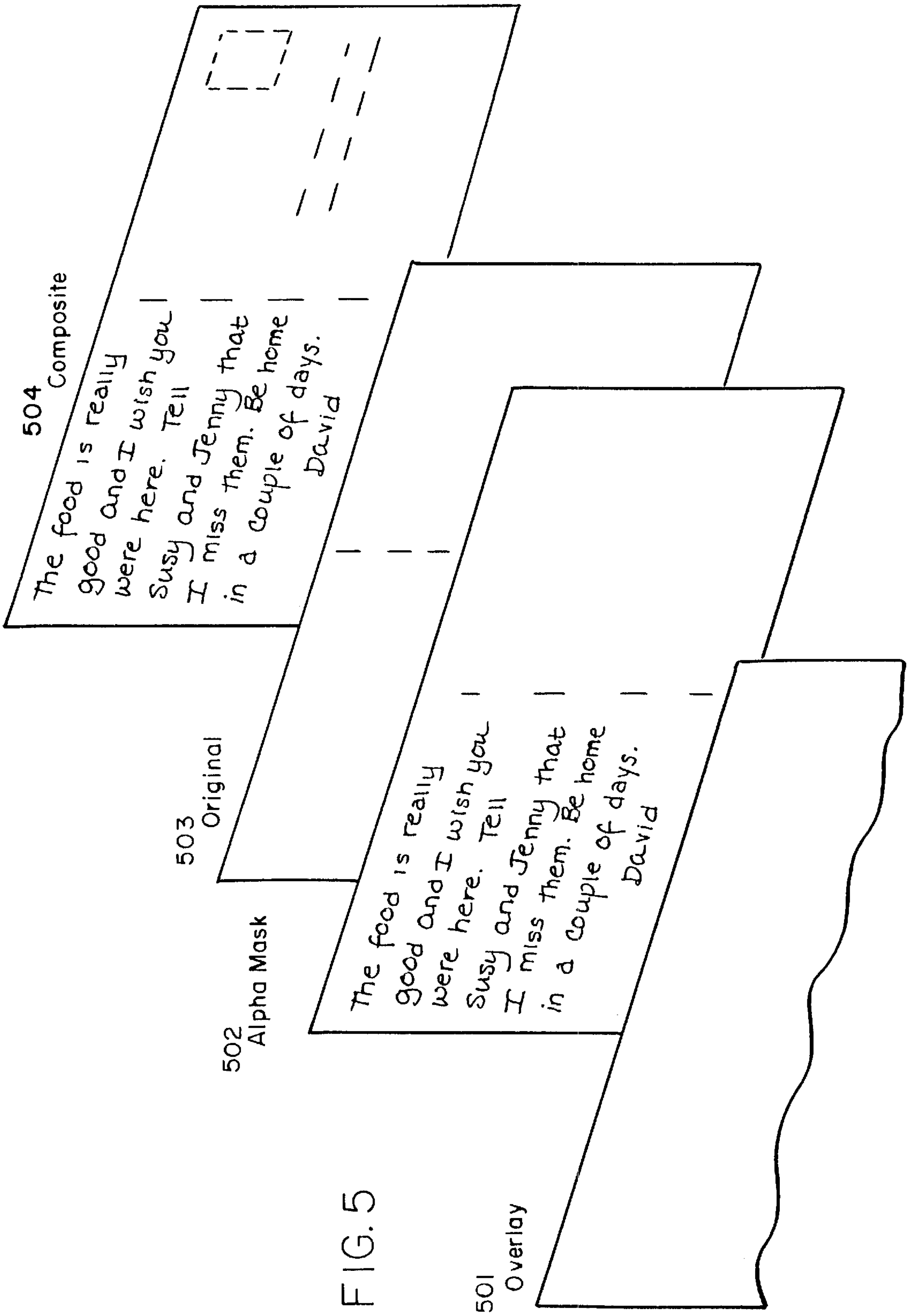

504 Composite
The food is really
good and I wish you
were here. Tell
Susy and Jenny that
I miss them. Be home
in a couple of days.
David
503 Original
502 Alpha Mask
The food is really
good and I wish you
were here. Tell
Susy and Jenny that
I miss them. Be home
in a couple of days.
David
501 Overlay

FIG. 5

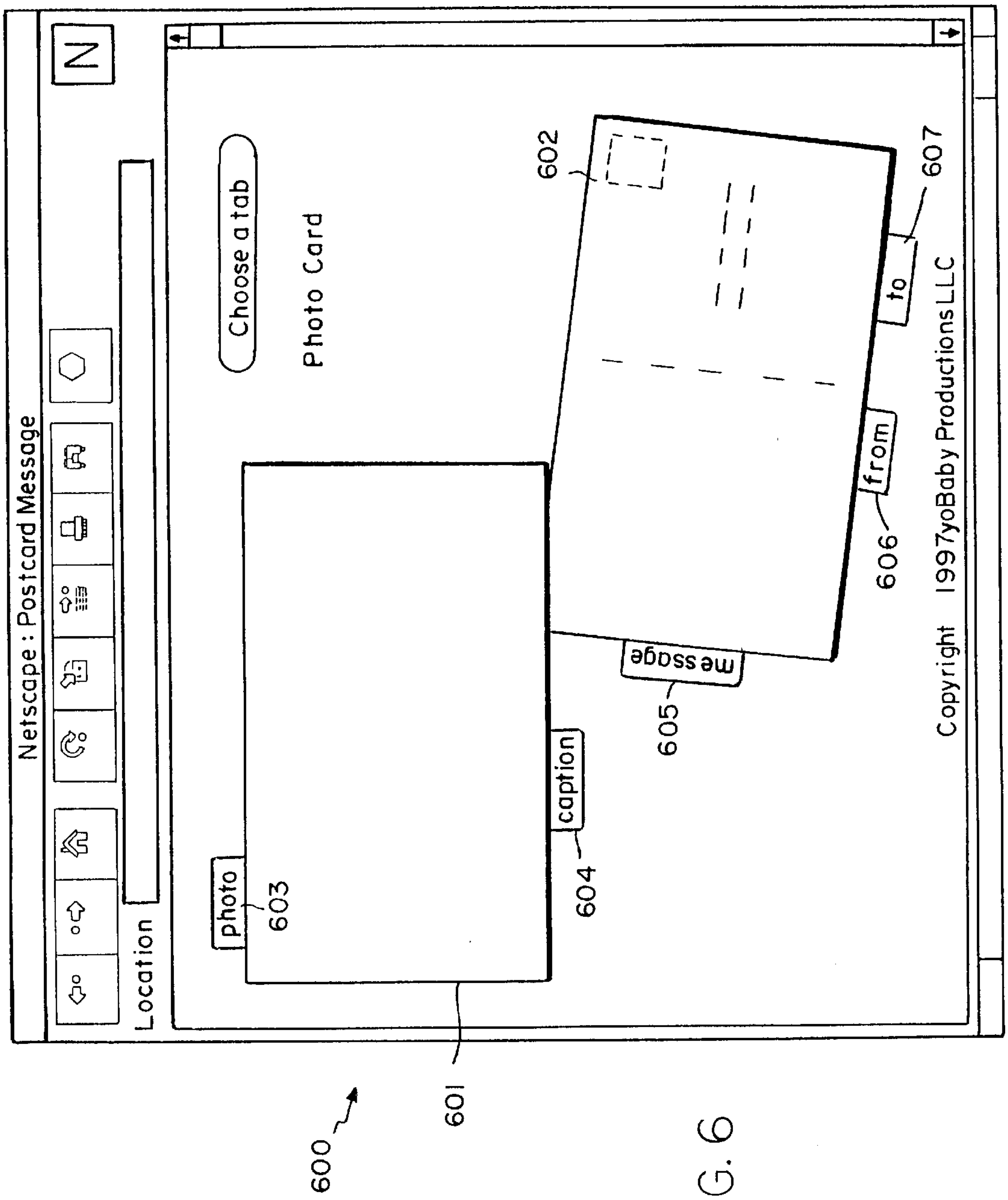

Netscape : Postcard Message
Location
Choose a tab
Photo Card
photo
caption
message
from
to
Copyright 1997yoBaby Productions LLC
600
601
602
603
604
605
606
607

FIG. 6

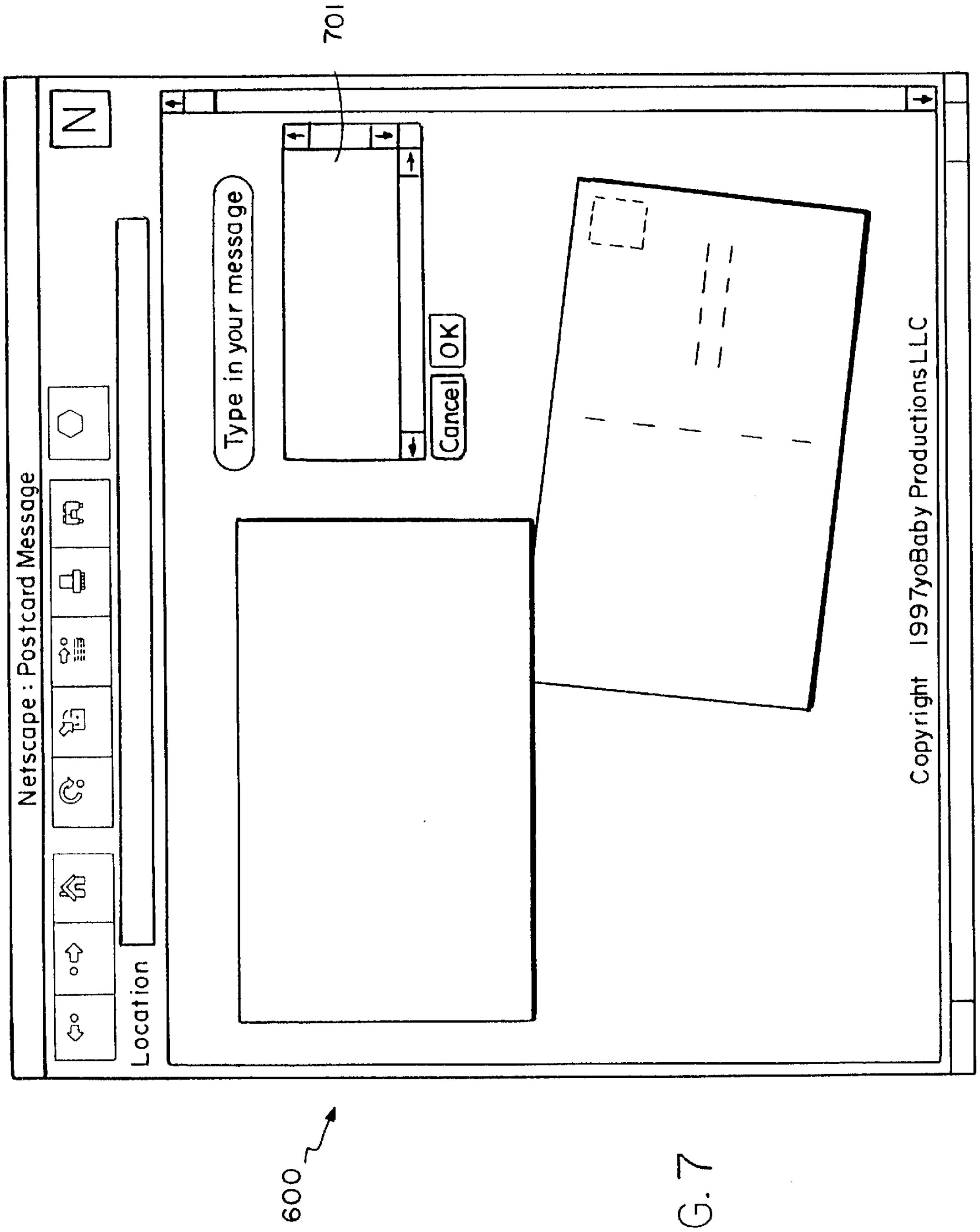

701
Netscape : Postcard Message
Location
Type in your message
OK
Cancel
Copyright 1997yoBaby Productions LLC
600

FIG. 7

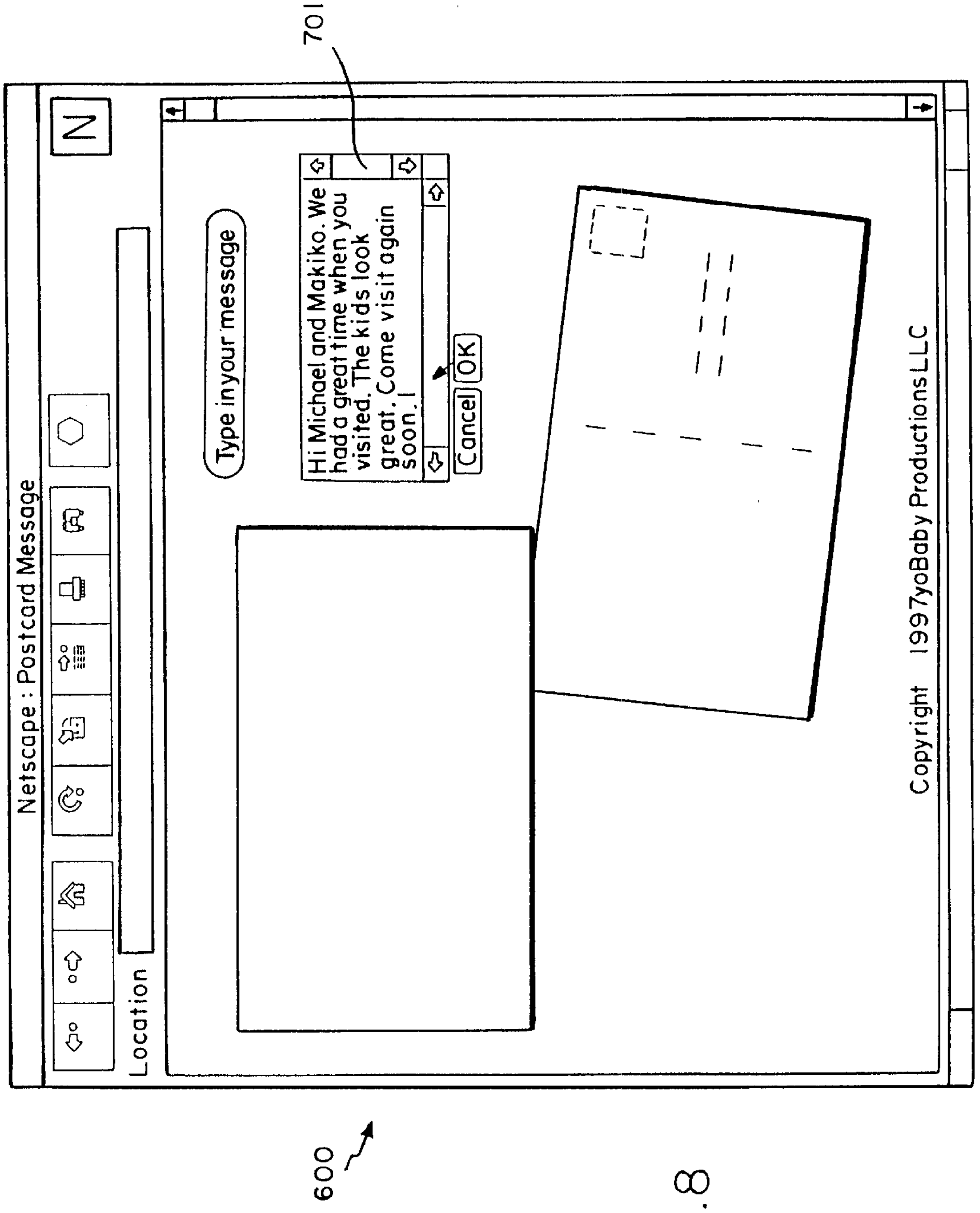

701
Netscape : Postcard Message
N
Location
Type in your message
Hi Michael and Makiko. We had a great time when you visited. The kids look great. Come visit again soon. I
Cancel
OK
Copyright 1997yoBaby Productions LLC
600

FIG. 8

600

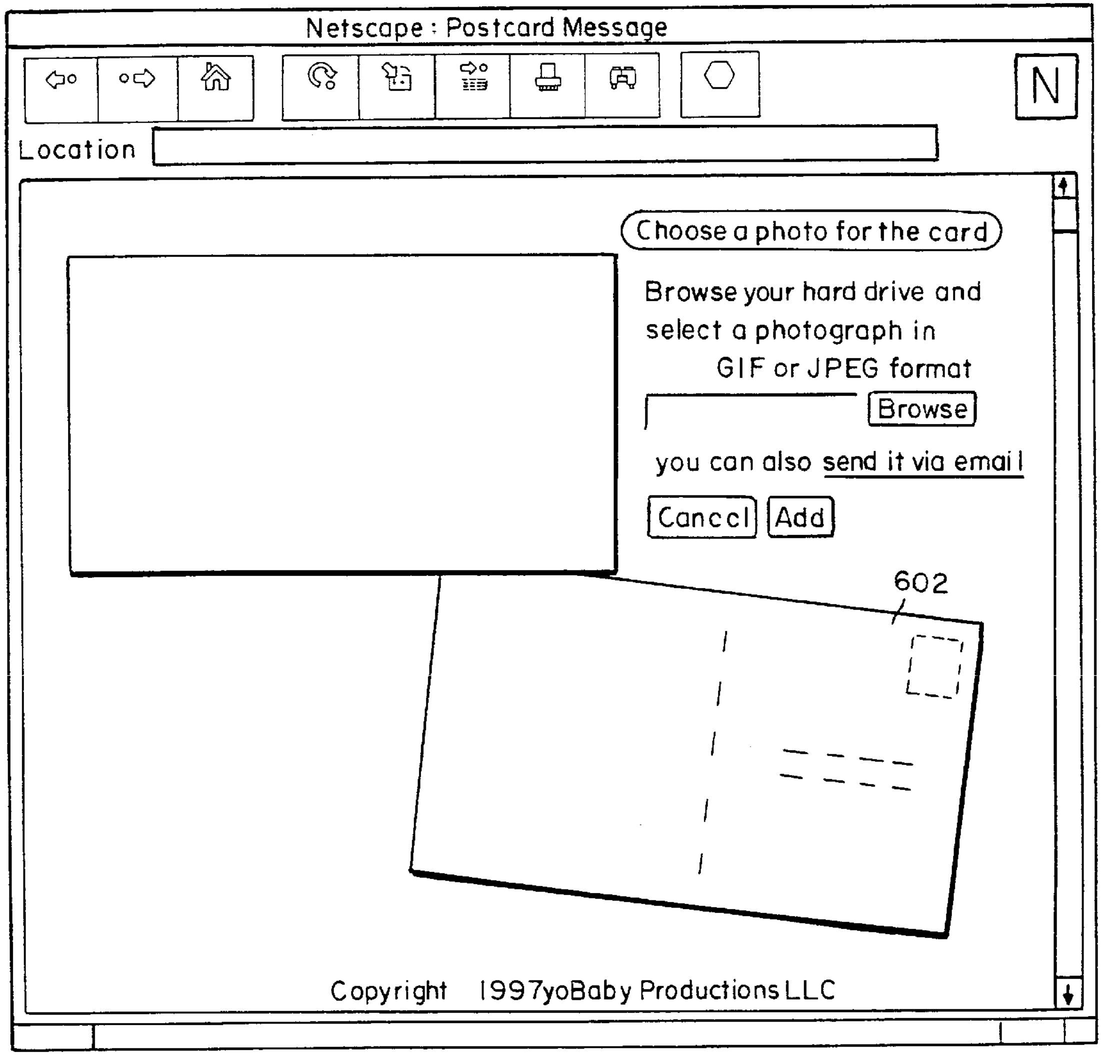

Netscape : Postcard Message
N
Location
Choose a photo for the card
Browse your hard drive and select a photograph in GIF or JPEG format
Browse
you can also send it via email
Cancel
Add
602
Copyright 1997yoBaby Productions LLC

FIG. 9

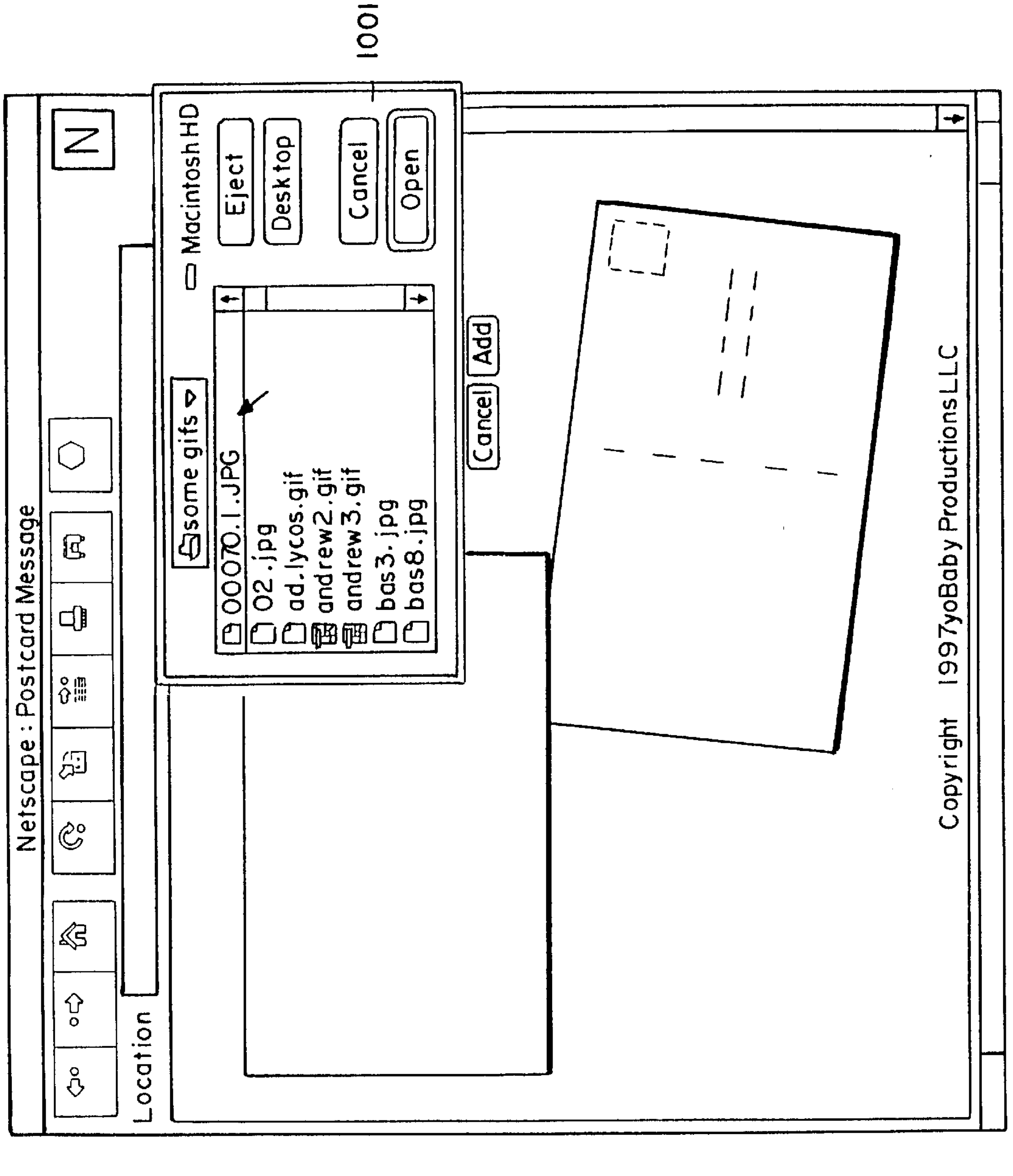
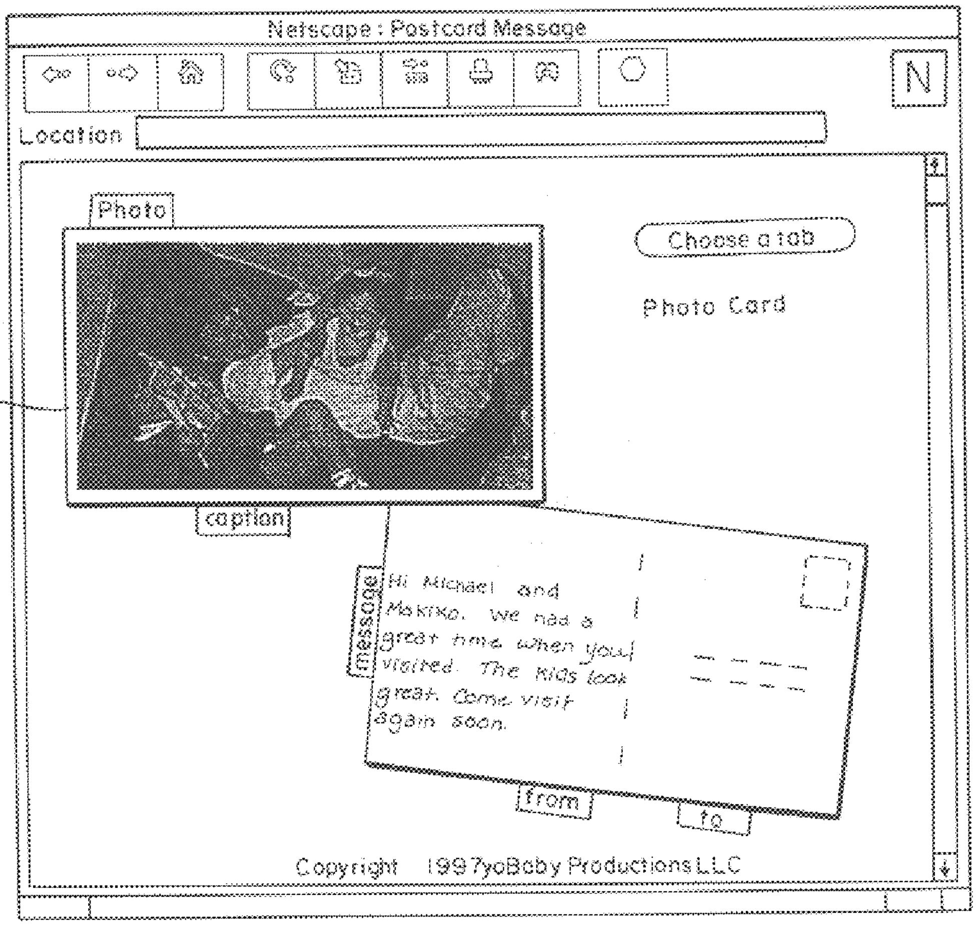

1001
Netscape : Postcard Message
Location
some gifs
Macintosh HD
Eject
Desktop
Cancel
Open
00070.1.JPG
02.jpg
ad.lycos.gif
andrew2.gif
andrew3.gif
bas3.jpg
bas8.jpg
Cancel
Add
Copyright 1997yoBaby Productions LLC
600

FIG.10

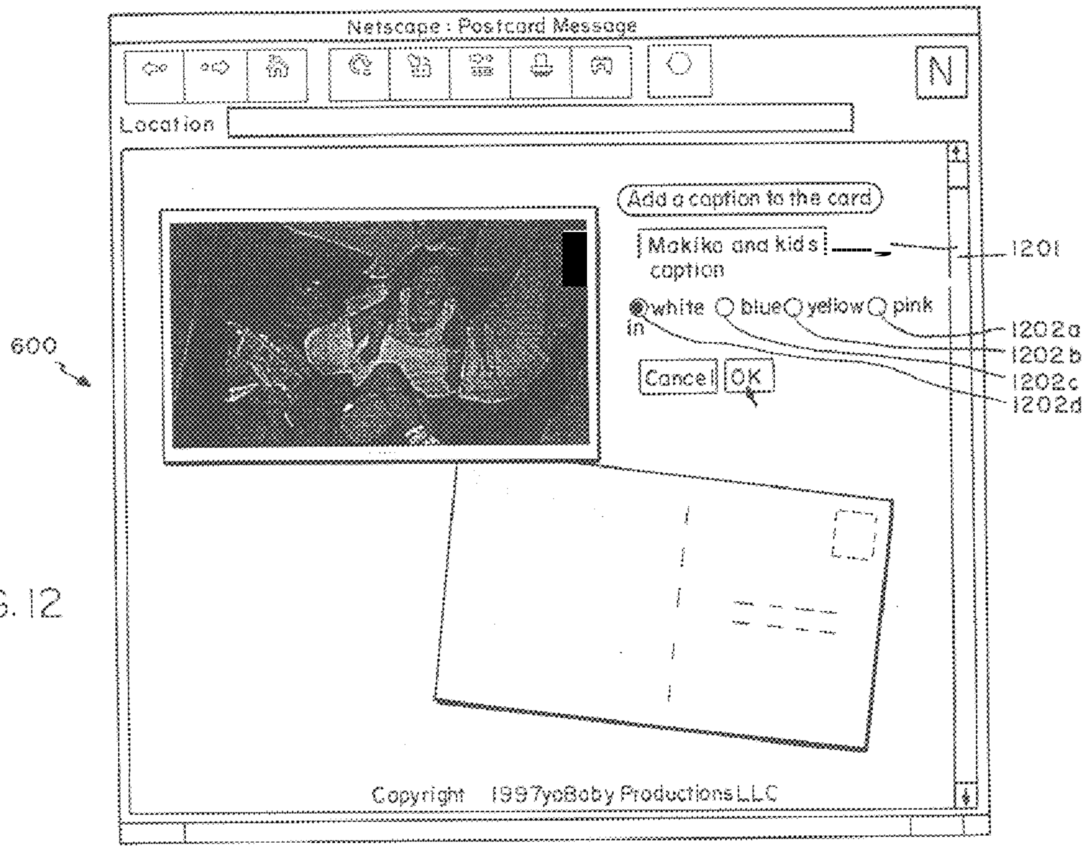
600

601



Netscape : Postcard Message
N
Location
Photo
Choose a tab
Photo Card
caption
message
Hi Michael and Makiko. We had a great time when you visited. The kids look great. Come visit again soon.
from
to
Copyright 1997yoBaby Productions LLC

FIG. 11



Netscape : Postcard Message
N
Location
Add a caption to the card
Makiko and kids
caption
white
blue
yellow
pink
in
Cancel
OK
Copyright 1997yoBaby Productions LLC
1201
1202a
1202b
1202c
1202d
600

FIG. 12

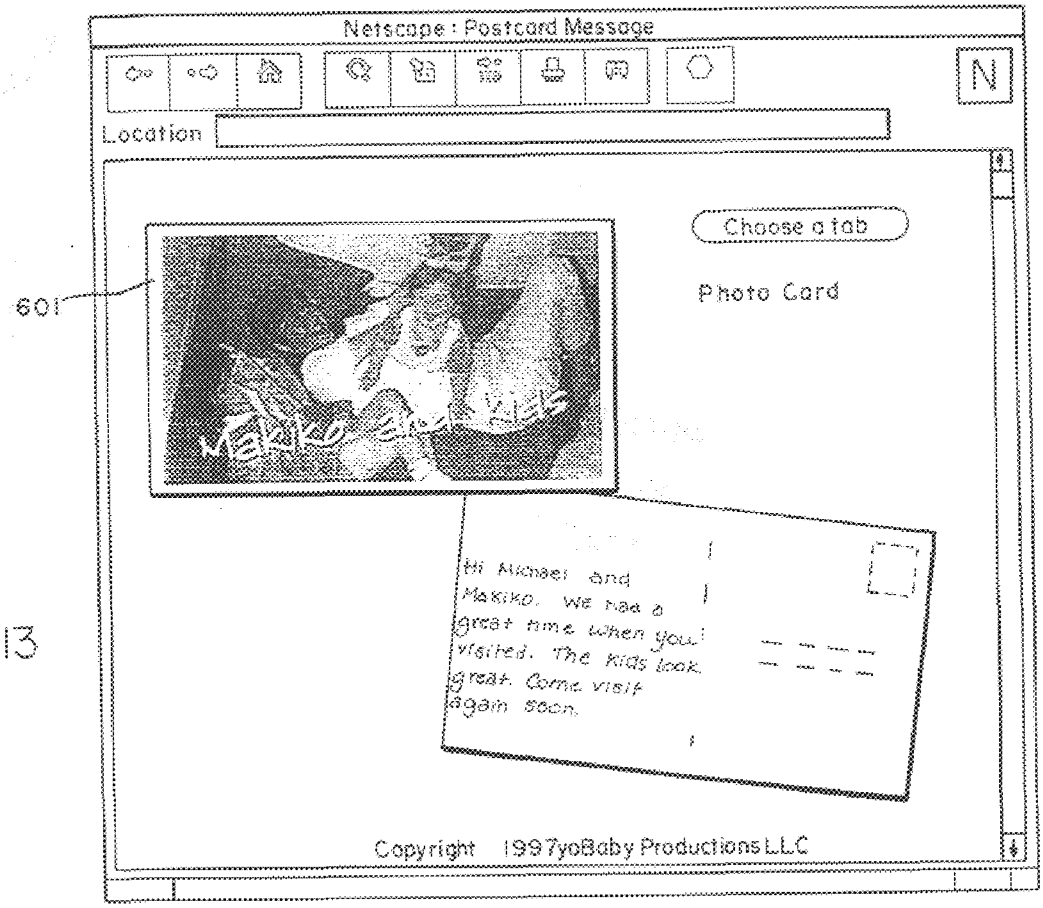

Netscape : Postcard Message
N
Location
Choose a tab
Photo Card
601
Hi Michael and Makiko. We had a great time when you visited. The kids look great. Come visit again soon.
Copyright 1997yoBaby Productions L.L.C

FIG.13

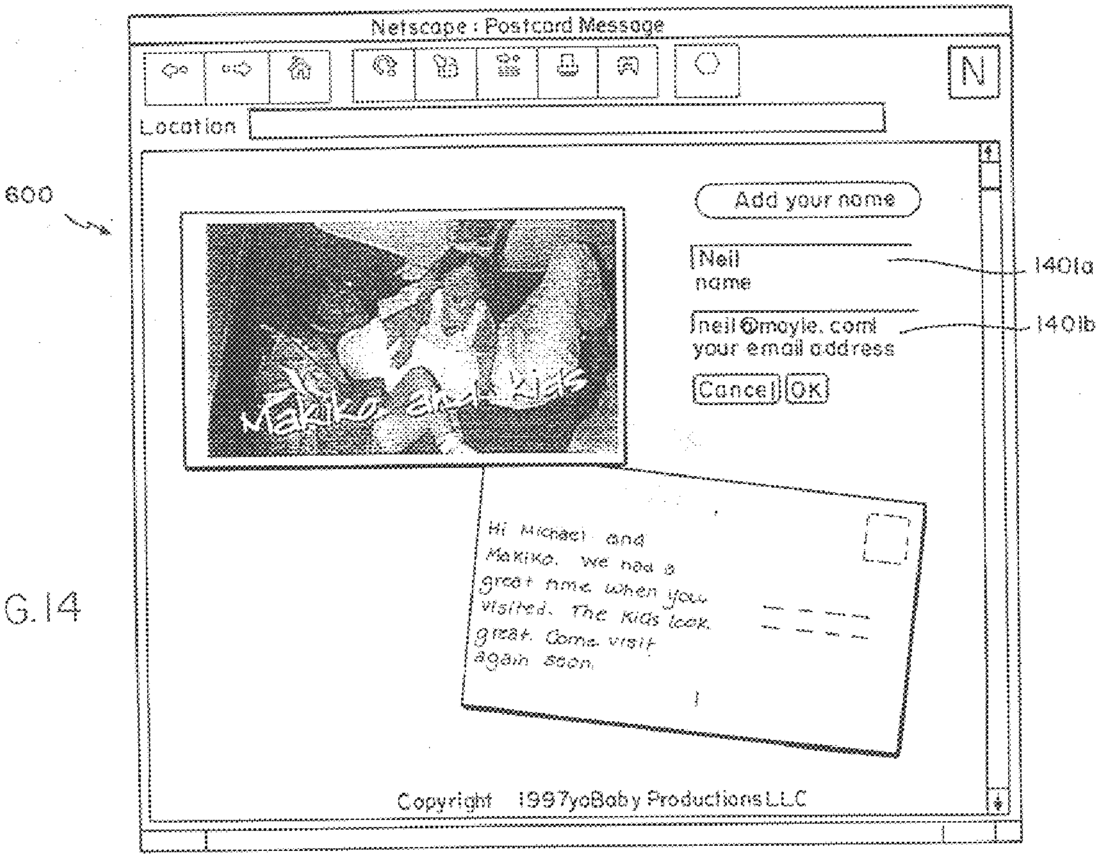
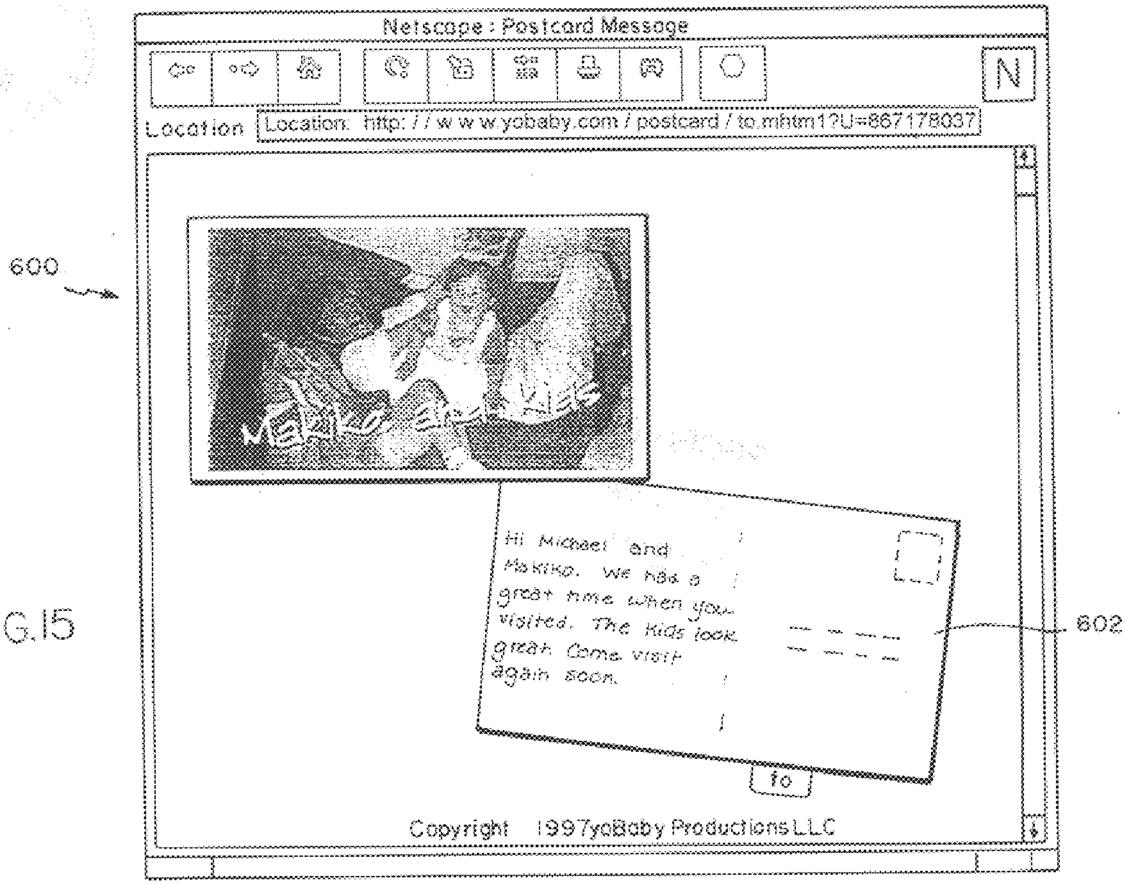
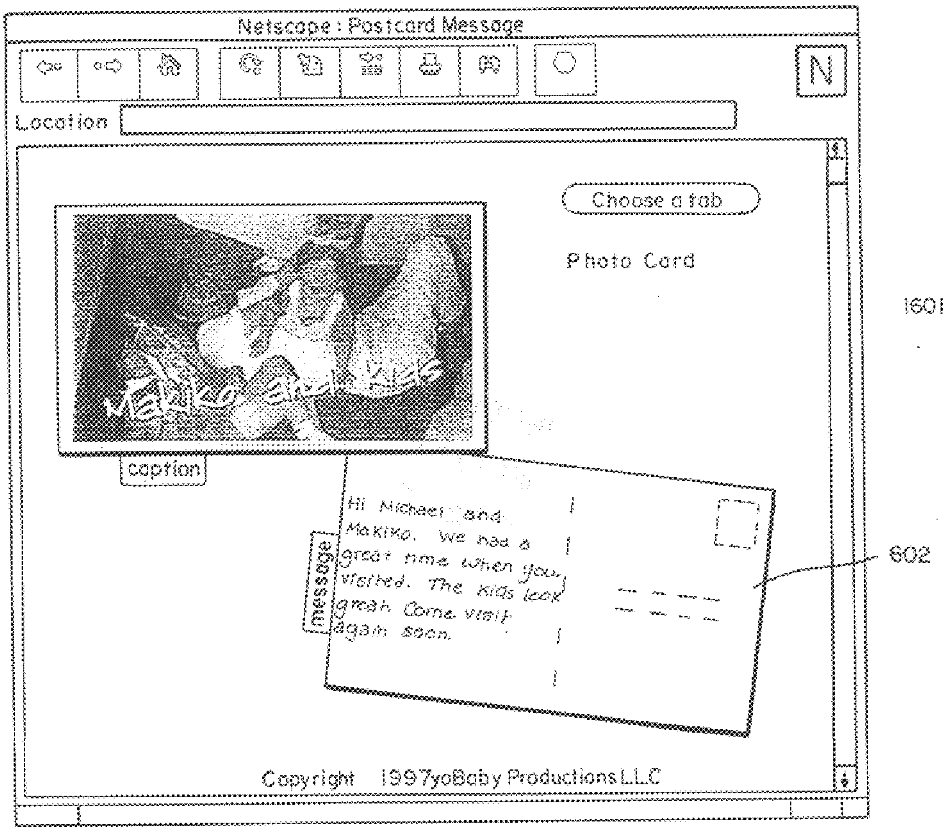

600
Netscape : Postcard Message
N
Location
Add your name
Neil
name
neil@moyie.com
your email address
Cancel
OK
1401a
1401b
Hi Michael and Makiko. We had a great time when you visited. The kids look great. Come visit again soon.
Copyright 1997yoBaby Productions LLC

FIG. 14



600
Netscape : Postcard Message
N
Location
Location: http: / / w w w.yobaby.com / postcard / to.mhtm1?U=867178037
Makiko and Kids
Hi Michael and Makiko. We had a great time when you visited. The kids look great. Come visit again soon.
602
to
Copyright 1997yoBaby Productions LLC

FIG. 15



Netscape : Postcard Message
N
Location
Choose a tab
Photo Card
1601
caption
message
Hi Michael and Makiko. We had a great time when you visited. The kids look great. Come visit again soon.
602
Copyright 1997yoBaby Productions LLC

FIG.16

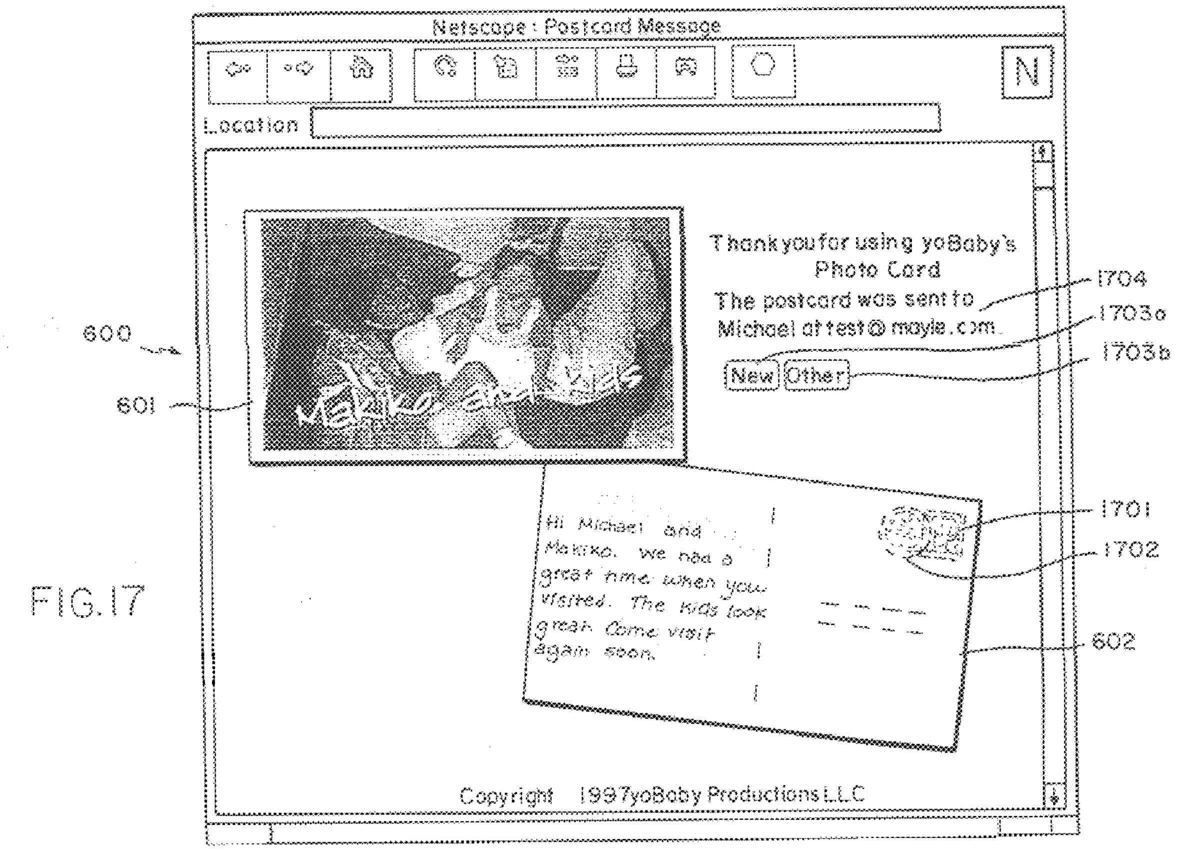

Netscope : Postcard Message
N
Location
Thank you for using yoBaby's Photo Card
The postcard was sent to Michael at test@moyle.com
New
Other
1704
1703a
1703b
600
601
1701
1702
602
Hi Michael and Makiko. We had a great time when you visited. The kids look great. Come visit again soon.
Copyright 1997yoBaby Productions L.L.C

FIG.17

METHOD AND SYSTEM FOR CREATING MESSAGES INCLUDING IMAGE INFORMATION

The present invention relates generally to image processing and manipulation and more specifically to a system for the creation of electronic postcards.

BACKGROUND OF THE INVENTION

Photographic images or pictures may be represented and stored as a sequence of digital information. For instance, a photograph may be placed into a scanner connected to a computer system. The scanner is designed to convert images into digital information. A typical scanner comprises a row of discrete light sensors that are stepped sequentially across the photograph. At each discrete step the intensity and/or color of the photograph is measured by each discrete sensor in the row. The values are read out of the sensors prior to moving the row to the next discrete step. The row of light sensors is thus moved step-by-step across the photograph until the entire image is scanned. The end result is an array of data values representing the photographic image, where each value is the measurement taken by the discrete sensor element for a particular row. The information collected may then be transferred to a computer for further processing. This process of converting image information into discrete values representing individual picture elements or pixels is also known as scanning.

In the past, the typical way to create an electronic image was through such a scanner connected to a computer. Thus, if an individual desired to have a digital electronic photograph the individual would typically use a conventional photographic camera to create a film image, have it processed onto photographic paper, and then scan the image into a computer with a scanner. Recently, this process has changed with the advent of digital cameras—cameras that directly create a digital photograph that may be transferred directly into a computer.

The creation of digital cameras has created an opportunity to utilize the unique aspects of a digital photograph. For instance, a digital photograph can be sent across a computer network and shared by others electronically. In addition, digital photographs allow further image manipulation.

Recent advances in technology have broadened the utility of digital photographs. The first advance is the penetration of powerful personal computers in the home environment. These new personal computers are capable of running complex processing applications. Today, a typical system includes a 32 bit processor, large memory array, high capacity mass storage device, high resolution color monitor and fast modem. The price for such a system is now within the budget of many households.

The second advance is the development and acceptance of the world wide web (WWW, web or Internet) as a mode of exchanging electronic information. The web is a network of computer systems that allow the free interchange of information. Users at a home computer or clients connects via a modem to the web via an Internet Service Provider (ISP) which provides users local access to the web. Users seeking access to the web typically dial up and connect to an ISP, which acts as an intermediary and passes data between the web and the user. Also connected to the web are servers—computers capable of supplying information or services to users. Each individual computer connected to the web has a unique identifier so that information can be directed to the proper location. Information is passed between users on the web via pages displayed on a browser.

ISPs also provide the home user the ability to send and receive electronic mail (email). Often an individual accessing the web will have an email address, a unique identifier for a particular user that allows that user to receive mail. The ISP will receive the email for the user and store it until the user dials into the ISP to actually retrieve the messages.

These events have created a situation where an individual at home can download the images captured by their digital camera or scanner into their home computer, connect to the web by modem in their computer, and transmit their picture onto the web. Thus, the individual can send the image to a second person, at a remote location.

As digital cameras become widely accepted, a greater need will arise for flexibility in the electronic distribution of images. Current methods for distribution include email where the digital photograph is converted to a textual representation, sent to the remote user who then converts the textual representation back into the digital photograph. Users may also distribute the digital photograph via predesigned web pages which allows any number of remote users to examine the digital photograph. None of the current mechanisms allow the user to transfer a digital photograph to a server, process the image data into a display and send a notification to one or more specific individuals to view the display.

SUMMARY OF THE INVENTION

Accordingly, it is a goal of the present invention to provide a system which can load a picture image onto a server and to provide notice to specific individuals.

It is an alternate goal of the present invention to allow the creation of electronic postcard composed of the user's digital photograph.

It is an alternate goal of the present invention to allow the creation of electronic postcard that mimics aspects of a conventional postcard.

It is an alternate goal of the present invention to allow the creation of electronic postcard having a postmark or logo information.

It is an alternate goal of the present invention to allow the creation of electronic postcard that includes the ability to merge text information with the digital photograph.

Other objects will be obvious and will appear hereinafter. The invention comprises an article of manufacture as exemplified in the following summary and detailed description.

The present invention is a system and method for processing electronic image data. The system comprises at least one server computer connected to a network. The server is adapted to receive electronic image data from a second computer connected to the network. The server processes the electronic image data and creates a display containing at least a portion of the processed electronic image data. One or more displays may be assigned a unique identifier. The data representing the display is in a format that allows for transmission to and viewing on a client computer. Viewing on the client computer is preferably accomplished via a web browser. The server is also adapted to send a notification containing the unique identifier to at least one person via the network. The person receiving the unique identifier can retrieve the one or more displays represented by the identifier from the server for viewing.

The processing on the server consists of one or more of the following: captioning, formatting, storing, transmitting, centering, cropping, flipping, anti-aliasing, scaling, compressing, filtering, color correcting, adding special borders and/or corner motifs, blurring, and adding visual effects. In addition, the client may be augmented to perform a portion of the processing during interactions with the server.

The data for the electronic image may also be provided via a photo processor where film is developed and then converted into an electronic image. The data representing the electronic image may then be transferred from the photo processor to the client computer or directly to the server computer.

The above mentioned objectives of the present invention will become more apparent and the invention itself better understood with reference to the following description of the embodiments of the present invention in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing discussion will be understood more readily from the following detailed description of the invention, when taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a simplified block diagram of connections to the web;

FIG. **2** is a simplified block diagram of a server and personal computer as found in FIG. **1,** illustrating a portion of the functions utilized by the present invention;

FIGS. **3***a* and **3***b* are flowcharts of the steps executed by a personal computer of the present invention in creating the front and back of an electronic postcard;

FIG. **4** is an example screen of the present invention indication the static and generated image areas;

FIG. **5** is a diagram illustrating the process of creating a generated image area and particularly the compositing of text on an image;

FIG. **6** is an image of the present invention electronic postcard creation page, as displayed within a browser window, where the electronic postcard is empty of user information;

FIG. **7** is an image of the present invention electronic postcard illustrating the prompt for a message;

FIG. **8** is an image of the present invention electronic postcard illustrating the input of a message;

FIG. **9** is an image of the present invention electronic postcard illustrating the prompt for input of an input image;

FIG. **10** is an image of the present invention electronic postcard illustrating the selection of an input image;

FIG. **11** is an image of the present invention electronic postcard illustrating the input image placed on a side of the postcard;

FIG. **12** is an image of the present invention electronic postcard illustrating the prompt for an image caption;

FIG. **13** is an image of the present invention electronic postcard illustrating the composite created from the input image and image caption;

FIG. **14** is an image of the present invention electronic postcard illustrating the prompt for the sender's name and address;

FIG. **15** is an image of the present invention electronic postcard illustrating the prompt for the recipient's name and address;

FIG. **16** is an image of the present invention electronic postcard illustrating the completed postcard prior to sending to the recipient; and

FIG. **17** is an image of the present invention electronic postcard illustrating the display of a sent postcard.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

System Architecture

The present invention relates to a system for the generation of electronic postcards for distribution via an electronic network. FIG. **1** illustrates a simplified view of a network of computers. Two basic machines are connected to the network, user (or client) computers **10** and **20,** and server systems **31** through **35.** User computers, for example computer **10,** are conceptually separate from server systems, as they provide the functions necessary for a typical user to connect to the network and exchange information with other user computers and server systems. In the present invention, the user computer 10 may interface to a variety of peripheral devices, including a scanner **12,** printer **13,** video camera **14** and digital camera **15.** In addition, the user computer **10** communicates via a communications device **11,** here illustrated as a modem, for communicating over the network.

The user computer **10** of the present invention is connected to a broader system of networked computers as illustrated in FIG. **1.** In this environment, user computer **10** connects via the modem **11** to an ISP **31**. The ISP provides the interface between the user computer and the web **30.** The ISP **31** may also provide other services, such a receipt and storage of user email, storage of user files and various other services. As the interface to the web **30,** the ISP **31** receives packets of data from the user computer **10** and stores the received information or forwards the information on the web **30** to the addressed destination. The addressed destination may be one of the servers **31–35** or may be a separate user computer **20.** One of ordinary skill in the art will appreciate the variety of configurations possible on such a network. While the web is illustrated as a single network, it is understood that it may comprise one of a number of local area networks (LANs) and wide area networks (WANs).

In the preferred embodiment, the electronic postcard functionality is implemented as a component of a web site. A web site is essentially a server computer providing public access to one or more files containing hypertext documents. A user utilizing a web browser running on a client computer **10** to access the hypertext documents stored on one or more server computer **31–35** located on the network **30.** The server, running hyper text transfer protocol (HTTP) web server software, transfers the hypertext document to the user computer for display on the browser. The present invention is directed to software that adapts the server to perform the functions necessary to create and transmit an electronic postcard.

Server

With reference to FIG. **2,** in the preferred embodiment a server **31** is a Pentium Pro (Intel Corporation, San Jose, Calif.) based computer connected to the Internet running the Linux operating system (Red Hat Software, Inc., Research Triangle Park, N.C.) and the MetaHTML web server software **61** (Universal Access Inc., Santa Barbara, Calif.). The web server software supports the HTTP protocol—the standard used in World Wide Web interaction. When a request is made over the Internet to view a web page, the server responds to this request returning a reply in the form of text describing the page in the hyper text markup language (HTML) format. A user specifies the page he would like to view with a Uniform Resource Locator (URL), or web address.

Database on Server

The server **31** is adapted to store and process data that is transmitted over the Internet. The present invention utilizes two type of storage: temporary storage and permanent storage. The temporary storage keeps the data that is entered by the user during a "session" of interaction with the site. The temporary storage is called the Session Database **62.** As the user makes changes to the postcard the data in the Session Database **62** is updated.

In order to manage the data for a particular user, each user is assigned a unique identification number that distinguishes that user's session from all others. This unique identification number is stored by the client via the web browser using a standard mechanism known as the "cookie mechanism." The identification number is used by the client as the key to the Session Database **62.** While the cookie is stored on the client, writing of the cookie and recording and retrieving data from the Session Database **62** is handled by the server via the MetaHTML software.

The electronic vostcard is comvosed of two data forms: textual and graphical. The textual data is stored in the Session Database while the card is being created. The graphical data (generated images and photographs) are stored in the file system of the server in a directory specifically created to store the temporary image files, herein designated as the Temp Image Database **65.** In the preferred embodiment, the directory name utilizes the same cookie identification number although various other naming schemes are possible. By using the cookie in the directory name, the system ensures that each user has his own temporary directory. This directory can be thought of as an extension of the Session Database **62.** The graphical data files are assigned names that are also stored in the Session Database.

After the electronic postcard is sent, the postcard data is stored "permanently" in two other databases. One database, called the Card Database **63,** stores the sender's and recipient's name and email address. The other database, called the Image Database **66,** stores the images that have been constructed for the front and back of the card. In the preferred embodiment, after the electronic postcard is sent and the data is stored in the Image Database **66,** the temporary graphical data files and session data can be deleted. As an alternate embodiment, the temporary graphical data files may be retained for additional uses, such as creation of an album of images.

The data in both the Card Database **63** and the Image Database **66** is keyed by a unique identifier called the Card Key that is created at the time the card is sent. This key—the information required for retrieving the electronic postcard data from the Card Database **63** and Image Database 64—is sent to the recipient of the card in a message. As a result, the recipient has sufficient information for interacting with the server so as to view the specific electronic postcard identified by the Card Key.

The Card Database **63** also stores the date that the card was sent and the number of times that the card has been viewed. The data for a card is typically stored for 14 days (the number of days is a number set when the system is configured, and is not a limitation of the server storage time). After that point the permanent card and image data may be automatically deleted. The data is also deleted after the card has been viewed 15 times (this number is also set when the system is configured). One of ordinary skill in the art can appreciate the possible variations for determining when to delete the data. As an alternate embodiment, the permanent card and image data may be retained for additional uses, such as creation of an album of images.

Like the Temp Image Database **65,** the Image Database **66** uses the file system to store the image files. The files are stored in a directory whose name is derived from the Card Key. In this case, there is a separate directory created for each card that is sent.

Dynamically generated web pages

The present invention is adapted to process text and graphic data to create an electronic postcard that is composed of custom generated HTML pages including generated images within the HTML pages. The system looks at the data it has stored from previous user inputs and creates the HTML page to achieve the custom look desired by the user. The user specifies the look by supplying the graphical data to upload, the style parameters for the look of the card and text for the textual content and address. Certain style characteristics may be automatically determined from the user data. For example, different HTML text is generated when the photo is horizontally oriented than when it is verticallv oriented. Orientation is. in turn. determined bv the aspect ratio of the graphical data uploaded by the user.

The electronic postcard **400,** as illustrated in FIG. **4,** is composed of HTML pages consisting of tables, with some cells of the table containing static images and some cells containing generated images. Static images **401** to **406** are created once and do not change during further modifications to the postcard. Generated images **407** through **409** change during the customization of the postcard and are thus regenerated as required. The use of static and generated images improves the efficiency of the system by preventing the recreation and retransmission of images that are essentially "fixed" during operation of the system.

When a user enters text or makes a style selection, this input is sent to the server and is stored and processed using code residing on the server. This process uses a scripting language such as MetaHTML or Dynamo (Art Technology Group, Boston, Mass.) (detailed algorithms of this process are outlined below in the "Use" section). The server then sends to the client a new HTML page containing the updated information and regenerated images. In order to improve operation of the system, only those sections of a displayed page are updated during an update of the information. Thus, only the images of the portion of the display that depend on the changed data will be regenerated and retransmitted. For example, referring to FIG. **4,** generated portion **408** includes a caption and therefore portion **408** will be regenerated and retransmitted if the caption text data is modified.

Client

With reference to FIG. **1,** in the preferred embodiment the user or client computer **10** is a personal computer that is connected to the Internet. The computer can be a Apple Macintosh (Apple Computer, Inc., Cupertino, Calif.), an IBM-compatible machine (IBM Corp., Armonk, N.Y.) or any other computer capable of running a standard web browser. The client connects to and communicates on the web using the TCP/IP protocol. The actual physical connection is not critical for the present invention, and may be accomplished via a dedicated line or a modem via a dialup connection. Turning to FIG. **2,** in the preferred embodiment, the user computer **10** runs the Microsoft Windows 95 operating system (Microsoft Corporation, Redmond, Wash.) and a browser **51** such as Netscape Navigator (Netscape Communications Corporation, Mountain View, Calif.) or Microsoft Internet Explorer (Microsoft Corporation, Redmond, Wash.). The browser may be further augmented for supporting the Java language (Sun Microsystems, Inc., Mountain View, Calif.) to enable the browser to support processing local to the client.

The browser **51** is the application running under the operating system on the client computer that allows the user to make style selections, enters text and uploads photos. The browser **51** displays the pages received from the server **31** and collects user input for transmission to the server **31.** The pages in the preferred embodiment are written in standard HTML capable of being displayed on the web browser with no additional plug-ins or other applications.

Graphic data uploaded by the user at the user computer **10** may be supplied from a variety of sources. For instance graphical data representing drawings created by programs such as Corel Draw (Corel Corporation, Ottawa, Ontario, Canada), Adobe Illustrator or Adobe Photoshop (both of Adobe Systems Incorporated, Seattle, Wash.) can be used as image data for uploading. For graphical data representing digital photos, various sources of data are possible. As illustrated in FIG. **1,** the user computer can receive data from a digital camera **15,** video camera **14,** scanner **12,** or from a film processor who provides electronic image data. In addition to the different sources, a variety of graphical data formats can be used to encode the image information. In the preferred embodiment, graphical data is provided in the JPEG or GIF format.

In the preferred embodiment of the present invention, a separate client computer, such as user computer **21** of FIG. **1,** may be the receiver of the electronic postcard. For reception of the electronic postcard, the receiving computer should have access to an email account and be able to send and read email using a standard email reader such as Eudora (QUALCOMM, Inc., San Diego, Calif.) or Netscape Navigator.

Operation of the System

As illustrated in FIG. **17,** the electronic postcard has the familiar "look and feel" of a standard postcard, with a photo on one side and a personalized message and recipient's name on the other. The user fills in the electronic postcard with personalized information: recipient's name, message, signature; and uploads a photo selected by the user that will appear on the card. After the user has specified the information to appear on the electronic postcard, an email message is automatically sent to the recipient notifying them of the card.

Connect the computer to the Internet

The electronic postcard user must first connect their personal computer to the Internet using a modem and a telephone line. Using standard SLIP or PPP software the user instructs the modem to dial an Internet Service Provider. When the connection is made and all of the protocol hand shaking has completed, the user then connects to the server where they can create their electronic postcard.

Go to a site that offers Electronic Postcard

With an Internet connection the user can now use standard web browser software (such as Netscape Navigator or Microsoft Internet Explorer) to access a site that offers the electronic postcard service using the URL specific to this site.

The initial web page shows both sides of a blank postcard

When the user first comes to the site the initial web page, as illustrated in FIG. **6,** is a blank electronic postcard **600.** The layout shows both the front **601** and the back **602** of the postcard **600** on one screen. The front **601** will hold the photo and a brief caption describing the photo. The back **602** will have the recipient's name, the message text and the sender's signature and optionally a postmark indicating the time and date of sending. Both sides initially do not contain personal content, but have background graphics that resemble a classic blank postcard.

Choose a tab to fill in part of the Electronic Postcard

The user adds their personal information to the electronic postcard by clicking the tabs **603** through **607** that surround the front **601** and back **602** of the card **600.** The tabs **603** through **607** correspond to the different parts of the postcard that the user can fill in: sender's name and email address **606,** recipient's name and email address **607,** message to the recipient **605,** a user-selected photo **603,** and a photo caption **604.** When the user clicks a tab a new web page appears that contains a form with input fields for the selected part of the card. There is a different page for each tab. As an alternative embodiment other indicators could be used, for instance a sequential list of steps or a fixed sequence of steps could be implemented to complete the electronic postcard.

Specifying the parts of the Electronic postcard

The user clicks one of the tabs **603** through **607** to bring up the page that corresponds to that part of the electronic postcard. The page will contain a form that prompts the user to enter the information that will appear on the card. The user fills in the fields in the HTML form and clicks the OK button to transmit the data to the server computer. The transmission is handled through a standard HTTP Form POST request. The server processes the fields from the POSTed data and validates the information. If the information is valid it is stored in a field in the session database. If the information is not valid the user is redirected to an error page which describes the problem.

When the information in the session database changes, the server regenerates the postcard and the new information appears on the postcard. This process can also be used to change a field that has already been entered. The card is always displayed with all of the latest information in the correct locations.

FIG. **7** illustrates the display after selecting the message tab **605.** The electronic postcard generates a prompt **701** for the user to input a message for display on the back of the postcard **600.** FIG. **8** illustrates the input of an example message in the prompt **701.**

FIG. **9** illustrates the back of the card with the message rendered onto the postcard back image. The specific steps for creation of the rendered postcard back image is discussed below. FIG. **9** also illustrates the prompt **901** for a photograph after selecting the photo tab **(603** of FIG. **6.)** If the name of the file containing the photograph is known it may be entered, or the user may browse for the file **1001** as illustrated in FIG. **10.**

FIG. **11** illustrates the electronic postcard after the photo has been uploaded to the server and processed by the server. The steps for processing the photograph are described in detail below. The front of the postcard **600** now has the photograph placed onto the front **601.**

The front of the electronic postcard may also include a caption by selecting the caption tab **604** of FIG. **6.** The system then displays a prompt for the caption **1201** as seen in FIG. **12.** The caption **1201** may be displayed in a variety of colors by selecting a color via buttons **1202***a, b, c,* or ***d.*** In the example, the button for "white" has been selected. FIG. **13** illustrates the caption rendered onto the front **601** of the postcard **600.**

The final information needed for the postcard is the sender's and recipient's name and email address. FIG. **14** illustrates the electronic postcard system prompting for the sender's name after selecting the from tab **(606** of FIG. **6.)** The user specifies the name **1401***a* and the email address **1401***b* in the fields. The name is used for signing the postcard. The email address is used for facilitating further communications between the sender and the recipient. FIG. **15** illustrates the electronic postcard **600** with the senders name rendered onto the back **602.**

FIG. **15** also illustrates the prompt for the recipient's name and email address after selection of the to tab **(607** of

FIG. *6.)* The user specifies the name **1501***a* and the email address **1501***b* in the fields. The name is used for addressing the postcard. The email address is used for sending the Card Key to the recipient. FIG. *16* illustrates the electronic postcard *600* with the recipients name rendered onto the back *602.* At this point the electronic postcard is ready to be sent or the user may select any one of the tabs to correct or change the postcard.

FIG. *17* illustrates the card as sent to the recipient. The front **601** of the postcard **600** contains the photograph and caption. The back *602* contain the message, name of sender and name of recipient. In addition, a "stamp" *1701* and "postmark" *1702* have been added to the back *602.* The postmark *1702* contains the date and optional information such as location or advertisement rendered onto the card. The stamp *1701* contains a logo that can be selected by the user or generated by the system. If generated by the system, it may contain advertisement material specified by the operator of the electronic postcard server. When the system sends the card, a notice *1704* is given to the user that the postcard was sent. The user may then create another card by selecting one of the buttons **1703***a* or **1703***b*.

Generating the back of the postcard

The back of the postcard, which contains the message, recipient's and sender's names, is generated by a sequence of steps illustrated in FIG. *3b:*

Generate postmark date string **304**: After the card has been the sent the back of the card shows a postmarked stamp. The postmark shows the date that the card was sent and may include optional text. This information is stored in the Session Database when the user sends the card. It is formatted in a style appropriate for a postmark.

Determine the orientation of the postcard *307:* The front of the postcard can be displayed in two different orientations, depending upon the aspect ratio of the image uploaded by the user. If the photograph is taller than wide the postcard is shown with the card front displayed vertically. If the postcard is wider than tall than the front of the card is displayed horizontally. The orientation of the front impacts the back of the postcard in the preferred embodiment.

Select background image *308:* There are two different images used for the blank card back. In both images, the front of the postcard is shown slightly overlapping the back of the postcard. Through the use of shadows the front of the postcard is made to look like it is in front of the back of the postcard. The shadow that is cast on the back of the postcard is different for the two different orientations of the back of the postcard. In the upright portrait orientation as seen in FIG. *4,* the overlap of the front onto the back is at the low left edge of the back. In the landscape orientation, as illustrated in FIG. *8,* the overlap of the front onto the back is on the upper right edge of the back.

Generate page description file **305**: The layout of the text on the back of the card is described using a page description language, such as Postscript. The page description is coded to size and position the text fields (the text specified by the user for the message operation **301**, recipient's name and email address operation **302**, sender's name and email address operation *303,* and postmark operation *304).* It also contains code to break the message text into lines (line-wrapping) so that it fits in the appropriate area of the card. All of the text on the back of the card is drawn in a handwriting-style typeface, but could be drawn in a different prespecified typeface or a typeface selected by the user during operation of the system.

Render page description **306**: The page description is converted to a gray scale image using a rasterizing engine such as the Ghostscript Postscript interpreter (Red Hat Software, Inc., Research Triangle Park, N.C.). The result is called the text image.

Composite text image and card back background *309:* The text image is combined with the card background using a compositing routine. FIG. *5* illustrates the process for compositing a message and sender's name onto the postcard back. An all black image is used as the overlay *501,* the text image is used as the alpha mask *502,* and the card background is used as the original *503.*

The result is that:

- at any pixel that the text image *502* is black the overlay is passed through and the resulting image *504* is the overlay *501,* in this example black.
- at any pixel that the text image *502* is white the resulting image *504* is the same as the background image *503* at the corresponding pixel location.
- at any pixel that the text image *502* is gray, the resulting image *504* is a mixture of the overlay *501* (black) and the content of the background image *503* at the corresponding pixel. The exact mix depends on the gray level of the text image pixel.

Compress and convert the image *310:* The resulting image is finally compressed and converted into an image format viewable in a web browser (such as GIF or JPEG format). The result of this process is an image that shows the generated portion of the back of the postcard with the user's text displayed in a handwriting style typeface. FIG. *17* illustrates a completed postcard back *602.*

Upload photo

The photo tab is handled differently from the other tabs. With reference now to FIG. **3***a*, in the photo file operation *351,* the user specifies a file on the local client computer that holds the image data he or she wants to use on their card. The photo should be in JPEG or GIF format. The file name is specified using an HTML form with an INPUT field of type FILE. This field type is supported by Netscape Navigator browsers. The FORM data is POSTed to the server when the user clicks the OK button. The file contents are included with the form data and is received on the server.

On browsers that do not support INPUT fields of type FILE, the photo is transferred as an email attachment. The email is sent to a special address (e.g. picturedrop.yobaby.com) on the server site that is used for transferring pictures. The name part of the address would encode the specific session that the photograph is associated with. A mail server running on that electronic postcard server treats mail to this address specially. For example in a mail server such as Sendmail this is be handled by a rule for a special host. The rule pipes the message to a program that decodes the session id out of the recipient name and decodes the message body. The program could be written in a scripting language like Perl and the message could be decoded using a Unix program such as MUNPACK. The program writes the decoded image file to the Temp Image Database directory associated with the session.

Processing photo and generating postcard face

When a photograph is received on the server the Electronic postcard server software processes the photo using several steps as illustrated in FIG. **3***a:*

Check size and type *354:* The image data that is POSTed to the server must be in a size and format that the electronic postcard software can handle. The first step is to check the byte count of the data sent to the server. If the byte count exceeds some limit then the image is ignored and the user is redirected to an error page. Next the image data is saved as a temporary file and the type of the file is checked. The type is checking by examining the header bytes of the file which encode the file type. This is done use a program like the Unix command file. If the type is not one of the types supported by electronic postcard then the file is deleted and the user is redirected to an error page.

Uncompress and convert format of photograph ***355:*** The image data that is received from the user is typically in a compressed format. It can be in one of several formats. To more easily manipulate the image the server first converts it into a uniform uncompressed format such as Portable PixMap File Format (PPM), The conversion can be done using standard translation tools such as are contained in the Unix NetPBM library (software distributed from Washington University, St. Louis, Mo. as found in the directory specified by the URL http://wuarchive.wustl.edu/graphics/graphics/packages/NetPBM).

Scale the photograph ***356:*** The front of the postcard is a fixed size and the image must be scaled to fit this size. There are two different versions of the front of the card; one for each orientation. If the photograph is wider than tall then the horizontal (landscape) version is chosen. If the photograph is taller than wide then the vertical (portrait) version is chosen. Another problem is that the aspect ratio of the photograph may not exactly match the aspect ratio of the chosen card. The photograph is scaled so that one dimension exactly matches the desired size for the card and the other dimension is always larger than the card or exactly the same size.

Crop the scaled photograph ***357:*** If after scaling one dimension of the photograph is larger than the desired size for the card, the photograph must be cropped to fit onto the card. Since the aspect ratio of most pictures is similar (roughly 5x7) and the card is designed with approximately the same aspect ratio, the cropping is usually not significant. The cropping is done so that excess is removed equally from both ends (top and bottom or left and right) and the picture ends up centered on the postcard. The cropping can be done use a standard graphics routine such as Unix command pnmcut.

Generate page description file **358**: The layout of the text input during the caption operation ***352*** is drawn on top of the photograph is described using a page description language, such as Postscript. The page description is coded to size and position the caption text. It also contains code to break the caption text into lines (line-wrapping) so that it fits in the appropriate area of the card.

Render page description **359**: The page description is converted to a gray scale image using a rasterizing engine such as the Ghostscript Postscript interpreter. The result is called the caption image.

Select text color image ***360:*** The user selects the color in the text color operation ***353*** that they want to use for the caption text. Associated with each color is an image file that is filled with that color and is the size of the postcard front.

Composite caption image, text color and cropped photograph ***361:*** The caption image is combined with the scaled and cropped photograph using a compositing routine. This operation is similar to the composite text image and card background operation ***359*** of FIG. ***3b*** and illustrated in FIG. ***5*** as discussed above. In this case, the gray scale caption image is used as the alpha mask, the text color image is used as the overlay and the photograph is used as the original. The result is that:

at any pixel that the caption image is black the resulting image is the desired text color.

at any pixel that the caption image is white the resulting image is the same as the photograph at the pixel location.

at any pixel that the caption image is gray, the resulting image is a mixture of the text color and the content of the photograph at the corresponding pixel. The exact mix depends on the gray level of the caption image pixel.

To make the caption text stand out more from the photograph, the caption text is drawn with a contrasting "shadow". This is done via two compositing steps. Each step works as described above. The first compositing step uses the shadow color (typically black) as the overlay, the caption image as the alpha mask, and the photograph as the original. The second compositing step uses the text color selected by the user as the overlay, the caption image as the alpha mask and the result of the first step as the original. The shadow is composited with a slight offset so that it appears below and to the right of the caption.

Compress and convert the image ***362:*** The resulting image is finally compressed and converted into an image format viewable in a web browser (such as GIF or JPEG). The result of this process is an image that shows generated portion of the back of the postcard with the user's text displayed in a handwriting style typeface.

Sending the card

When a photo, sender, recipient and message have been specified the card is complete and can be sent. When the user clicks on the "Send" button the server creates a card key, saves the card into the Permanent Database and sends an email message to the recipient.

The contact information and the images are saved in the Permanent Database. The images for the front and back of the card are saved into the Image Database. The back of the card now includes a postmarked stamp. As already noted, the postmark is for the date the card was sent and the stamp can advertise the sponsor/host of the site. The sender's name, sender's email address, recipient's name and recipient's email address are saved into the Card Database. The date that the card was sent is also saved.

The email message that is automatically sent to the recipient states that there is a card available on the web site for the recipient and that it can be viewed by opening the specified URL. The URL includes the Card Key that uniquely specifies that particular electronic postcard.

Viewing the card

The recipient may view the card as soon as they receive the email message with the URL. The recipient will use a web browser to enter the URL, and view their personalized page.

Variations

While the preferred embodiment described above is directed to an electronic postcard, the system is not so limited. The present invention may apply to a variety of systems that require the user to upload image information for processing by the server into a display for viewing and to optionally provide a notice mechanism so as to alert an audience as to the availability of the created display. The present invention can be applied to create a variety of image processing systems, varying according to the degree of structure imposed on the system, the period of storage and the number of individuals to notify. For instance, the present invention can be modified to create:

Photo Contest: In this embodiment of the system, the user can upload an electronic image onto the server where a minimal amount of structure is imposed (possibly including scaling and format conversion.) The image data may be stored only for a short time, as long as the contest is open. Once uploaded, the system would send a notice (including the image identifier) to the judge or judges notifying them of the entry of the new electronic image.

Baby Journal: In this embodiment of the system, the user can upload an electronic image onto the server of a child or infant. The server may impose a fixed structure (i.e. a specific frame and format for the page holding the image) or allow a variety of structures for the user to select from. The image data could be retained for a long period, if not permanently. Once uploaded, the user can specify one or more recipients to receive notice of the new image, inviting them to visit and view the display. Thus, an album could be created for a child, holding a variety of images of the subject for a long period.

Family Album: In this embodiment of the system, the one or more related users can upload an electronic images. The server may impose a fixed structure (i.e. a specific frame and format for the page holding the image) or allow a variety of structures for the user to select from. The server may also segregate the electronic image displays according to each user (i.e. family member) while keeping a relation between all of the displays (overall family album.) The image data could be retained for a long period, if not permanently. Once uploaded, the users can specify one or more recipients to receive notice of the new image, inviting them to visit and view the display. Thus, an album could be created for an entire family, holding a variety of images of the family in a structured album. The system may be further extended to allow visitors to comment on the photos, with the system storing the comments in a database for display with the images.

In all of the above embodiments, the system can provide a variety of processing (e.g. captioning, formatting, storing, transmitting, centering, cropping, flipping, anti-aliasing, scaling, compressing, filtering, color correcting, adding special border and/or corner motifs, blurring, adding visual effects etc.) The embodiments can further be adapted to provide additional processing by the client computer of the electronic image data and/or the display. For example, the system could be modified to allow the user to drag the client computer's mouse to re-center the picture on the front of the postcard. Software, running on the client, could update the display to show the re-positioned photograph. The display update could proceed while the mouse is being dragged, without communicating with the server computer. Software running on the client computer can also preview the result of the various other types of image data processing e.g. scaling, filtering, color correcting, compositing text, etc. The result produced as result of this processing on the client computer could be at the same resolution as created by the server computer or it could be a lower quality so as to minimize processing time for the preview, thus allowing the server to actually produce the final processed information. The client computer software can be implemented in the Java language so as to run within a Java enabled browser

It should be understood that other embodiments could be created with variations in function, layout and look. Although the present invention has been described in detail with reference only to present preferred embodiments, it will be appreciated by one of ordinary skill in the art that various modifications can be made without departing from the invention. Accordingly, the invention is limited only by the following claims.

What is claimed is:

1. A method of sharing image data between a user and a recipient via a server adapted to communicate with a sending computer and a receiving computer, the server executing the steps of:

receiving image data embodying an electronic image, the image data transferred under control of the user at the sending computer, the image data residing in the sending computer or an image source separate from and in communication with the sending computer;

storing the received image data;

associating an identifier with the stored image data, the identifier adapted for use in retrieving the image data via a browser running on a computer;

receiving a message address from the sending computer for use in sending messages to the recipient;

generating a message including the identifier; and

sending the message to the receiving computer for retrieval by the recipient.

2. The method of claim 1 wherein the step of receiving the image data comprises uploading a file containing the data representing the electronic image from the sending computer.

3. The method of claim 1 wherein the step of receiving the image data comprises receiving an email message containing the image data.

4. The method of claim 1 wherein the step of receiving the image data comprises transferring a file containing the image data from a second computer.

5. The method of claim 1 wherein the step of receiving the image data comprises transferring a file containing the image data via an electronic file transfer protocol.

6. The method of claim 1 wherein the server further performs a step of manipulating the stored image data, the step comprising at least one operation selected from the set of operations comprising:

scaling, rotating, centering, mirroring, filtering, formatting, compressing, decompressing, color correcting, compositing, cropping, blurring, captioning, adding motifs, adding visual effects and combinations thereof.

* * * * *